U.S. DEPARTMENT OF COMMERCE, PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER
33973R002

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)
10/069239

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/SE00/01633	August 24, 2000	August 24, 1999

TITLE OF INVENTION
GRAVEL SORTER

APPLICANT(S) FOR DO/EO/US --Nils Lennart Nilsson

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ■ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.

2. □ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.

3. ■ This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(l).

4. ■ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ■ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
a.□ is transmitted herewith (required only if not transmitted by the International Bureau)b ■ has been transmitted by the International Bureau **(see Form 308)** c. □ is not required, as the application was filed in the United States Receiving Office (RO/US).

6. □ A translation of the International Application into English (35 U.S.C. 371(c)(2))

7. ■ Amendments to the claims of the International Application under PCT Article 34
a.□ are transmitted herewith (required only if not transmitted by the International Bureau)
b. □ have been transmitted by the International Bureau.
c. □ have not been made; however, the time limit for making such amendments has NOT expired.
d. ■ have not been made and will not be made.

8. □ A translation of the amendments to the claims under PCT Article 34 (35 U.S.C. 371(c)(3)).

9. ■ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. □ A translation of the annexes to the International Preliminary Examination Report under PCT Article 34

Items 11. to 16. below concern other document(s) or information included:

11. ■ An Information Disclosure Statement under 37 CFR 1.97 and 1.98. (w/ copy of PTO-1449 and each reference cited therein and Int'l Search Rept)

12. ■ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. ■ A FIRST preliminary amendment.
□ A SECOND or SUBSEQUENT preliminary amendment.

14. □ A substitute specification.

15. □ A change of power of attorney and/or address letter.

16. ■ Other items or information:

a) PCT Publ. WO 01/14643 with International Search Report (PCT/ISA/210) in English;
b) Formal Drawings (included with application) **and a Proposed Drawing Amendment with 1 sheet of amended drawings with red corrections shown (Fig.6)**
c) Formal Drawing Transmittal containing sheet 3/3 with corrections incorporated (on the assumption of approval of the changes in the Proposed Drawing Amendment)
d) Preliminary Examination Report (Form PCT/IPEA/409)
e) Notification of Receipt of Demand by Competent International Preliminary Examining Authority (Form PCT/IPEA/402)
f) Notice Informing the Applicant of the Communication of the International Application to the Designated Offices (Form PCT/IB/308)
g) PCT Request (Form PCT/RO/101)
h) Verified Statement Claiming Small Entity Status - Small Business Concern

U S DEPARTMENT OF COMMERCE, PATENT AND TRADEMARK OFFICE

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17. ■ The following fees are submitted:

	CALCULATION	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)):		
Search Report has been prepared by the EPO or JPO $890.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) $670.00		
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2) $760.00		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO $970.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$970.00	
Surcharge of $130.00 for furnishing the oath or declaration later than □ 20 □ 30 months from the earliest claimed priority date (37 CFR 1.495(e)).	$ -	

Claims	Number Filed	Number Extra	Rate		
Total Claims	11- 20 =	0	x $18.00	$ -	
Independent Claims	1- 3 =	0	x $84.00	$ -	
Multiple dependent claim(s) (if applicable)			+ $280.00		
TOTAL OF ABOVE CALCULATIONS =				$ 970.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				$ 485.00	
SUBTOTAL =				$ 485.00	
Processing fee of $130.00 for furnishing the English translation later than □ 20 □ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$ -	
TOTAL NATIONAL FEE =				$485.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property. +				$ 40.00	
TOTAL FEES ENCLOSED =				$525.00	
				Amount to be refunded	$
				charged	$

a. ■ A check in the amount of $525.00 to cover the above fees is enclosed.
b. □ Please charge my Deposit Account No. 02-4300 in the amount of $____ to cover the above fees. A duplicate copy of this sheet is enclosed.
c. ■ The Commissioner is hereby authorized to charge any additional fees which may be required with respect to any deficiency in the above noted "Basic National Fee", or credit any overpayment to Deposit Account No. 02-4300 .

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

SMITH, GAMBRELL & RUSSELL, LLP
1850 M Street, NW - Suite 800
Washington, DC 20036

Tel: (202) 659-2811
Fax: (202) 659-1462

SIGNATURE

Dennis C. Rodgers, Reg. No. 32,936
NAME REGISTRATION NO.

Date: February 22, 2002

33973R002 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Nils Lennart Nilsson

International Application No.: PCT/SE00/01633

International Filing Date: August 24, 2000

U.S. Serial No.: To Be Assigned Group Art Unit: To Be Assigned

Filed: : February 22, 2002 (Herewith) Examiner: To Be Assigned

For: GRAVEL SORTER

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to or concurrent with calculation of the filing fees, please amend this application as follows.

IN THE CLAIMS

Applicant has attached to this Amendment documents entitled "Amended Claims" and "Marked-Up Copy of Previous Claims". Please amend claims 3, 4 and 5 as shown in the document entitled "Marked-Up Copy of Claims". Please add new claims 6-11 as shown in the document entitled "Amended Claims".

REMARKS

Entry and consideration of this Preliminary Amendment is respectfully requested prior to or concurrent with calculation of the filing fees. This Preliminary Amendment is being filed to remove the multiple dependent claims to avoid the surcharge.

Examination on the merits is awaited.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: ______________________________

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February 22, 2002

MARKED UP COPY OF CLAIMS

3. A gravel sorter as claimed in claim 1 [or 2], in which the circumferential surface of the drum mainly consists of said screen cloth means (37).

4. A gravel sorter as claimed in [any one of the preceding claims] claim 1, in which the sorting unit comprises a supporting, rotating shaft (32) which is concentric with the centre axis of the drum and which supports the screw conveyor and the drum.

5. A gravel sorter as claimed in [any one of the preceding claims] claim 1, in which the inclination of the centre axis (32) of the sorting unit (30) is about 20° in relation to the horizontal plane.

AMENDED CLAIMS

3. A gravel sorter as claimed in claim 1, in which the circumferential surface of the drum mainly consists of said screen cloth means (37).

4. A gravel sorter as claimed in claim 1, in which the sorting unit comprises a supporting, rotating shaft (32) which is concentric with the centre axis of the drum and which supports the screw conveyor and the drum.

5. A gravel sorter as claimed in claim 1, in which the inclination of the centre axis (32) of the sorting unit (30) is about 20° in relation to the horizontal plane.

6. (New) A gravel sorter as claimed in claim 2, in which the circumferential surface of the drum mainly consists of said screen cloth means (37).

7. (New) A gravel sorter as claimed in claim 2, in which the sorting unit comprises a supporting, rotating shaft (32) which is concentric with the centre axis of the drum and which supports the screw conveyor and the drum.

8. (New) A gravel sorter as claimed in claim 3, in which the sorting unit comprises a supporting, rotating shaft (32) which is concentric with the centre axis of the drum and which supports the screw conveyor and the drum.

9. (New) A gravel sorter as claimed in claim 2, in which the inclination of the centre axis (32) of the sorting unit (30) is about 20° in relation to the horizontal plane.

10. (New) A gravel sorter as claimed in claim 3, in which the inclination of the centre axis (32) of the sorting unit (30) is about 20° in relation to the horizontal plane.

11. (New) A gravel sorter as claimed in claim 4, in which the inclination of the centre axis (32) of the sorting unit (30) is about 20° in relation to the horizontal plane.

33973R002

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Nils Lennart Nilsson

International Application No.: PCT/SE00/01633

International Filing Date: August 24, 2000

U.S. Serial No.: To Be Assigned

Group Art Unit: To Be Assigned

Filed: : February 22, 2002 (Herewith)

Examiner: To Be Assigned

For: GRAVEL SORTER

PROPOSED DRAWING AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Submitted herewith for the Examiner's approval is one (1) sheet of drawing containing red ink corrections to Figure 6.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: _____

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Dated: February 22, 2002

10/069239

JC19 Rec'd PCT/PTO 22 FEB 2002

33973R002

PATENT

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Examiner: To Be Assigned

For: GRAVEL SORTER

FORMAL DRAWING TRANSMITTAL

Commissioner for Patents
Washington, D.C. 20231

Sir:

Enclosed herewith is one (1) sheet of Formal Drawing. The formal/corrected drawing sheet incorporates the change appearing in the proposed drawing amendment filed concurrently herewith.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: ______________________

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Dated: February 22, 2002

10/069239

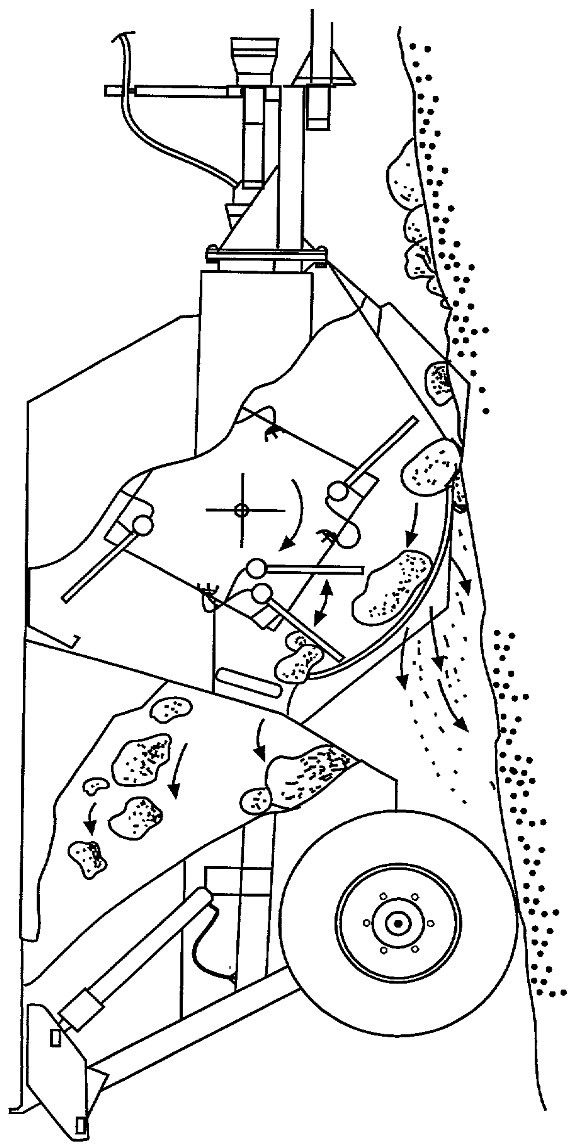

Fig. 6 (Prior Art)

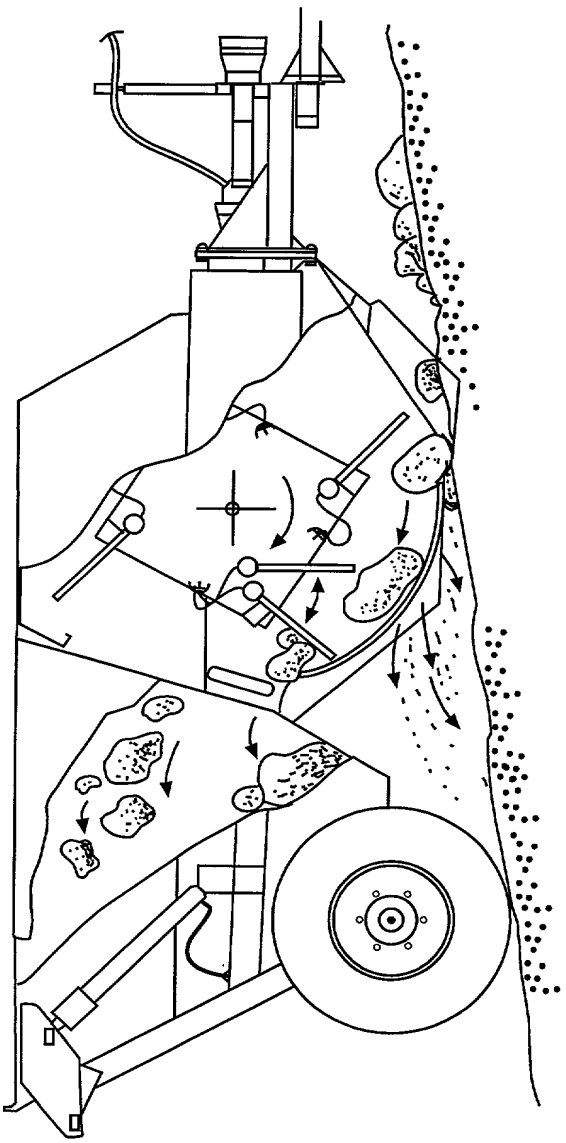

Fig. 6 (Prior Art)

10/069239
10 RC 22 FEB 2002
WO 01/14643 PCT/SE00/01633

GRAVEL SORTER

Technical Field

The present invention relates to a mobile gravel sorter, which is arranged to move in a direction of travel along a road, comprising a gathering unit which isarranged to gather up granular material from a roadway as the gravel sorter moves in the direction of travel, a sorting unit for sorting and supplying to the roadway the amount of the material that is smaller than a given grain size, which sorting unit comprises a substantially circular drum which is arranged after the gathering unit in the direction of travel and which has a centre axis, an inlet means in connection with the gathering unit and an outlet means which is arranged in connection with the collecting unit and separated from the inlet means in the longitudinal direction of the drum, a collecting unit for collecting material exceeding said given grain size, and a screen cloth means which is arranged to cover openings in the circumferential surface of the drum.

Technical Background

As described in the brochure "road maintenance bare ground" issued by the National Swedish Road Administration, the wearing course of a gravel road is worn and ground down under the action of traffic and grading. The coarse material is crushed to a sandy material. The fine material dusts away and some of the gravel material is thrown out on the embankment. The wearing course is transformed into gravel which is sensitive to corrugation and has an excess sand fraction. After some time, the gravel road has such poor standards as concerns the composition and thickness of the wearing course and a reduced runoff of surface water that it is necessary to take measures to improve the wearing course and the water runoff.

A well-balanced cycle of measures to maintain acceptable runoff of surface water and a correct composition of the wearing course is important to obtain the lowest possible total cost of gravel road maintenance.

Today, there are about 284,000 km private roads in Sweden which are covered with a new layer of gravel year after year. This results in high costs and has a considerable impact on the environment, since gravel is getting scarce. The gravel that has been spread out on the roads has not disappeared, but most of it has been pressed out into the ditches.

According to prior-art methods and by using prior-art road machines, the maintenance is carried out by adding gravel and stone material having a fraction of 4-18 mm, which is the ideal size of the gravel and stone material in order to obtain a satisfactory bearing capacity, and possibly by cutting the edges of the roadway and drawing up the thrown-out material. The material that has slid down the embankment has a relatively high share of material with a size in the upper range of said fraction and therefore it is of great interest to recover this material.

The drawn-up material sometimes comprises a high amount of turfs and contains relatively large stones, and herefore it cannot be used directly since such a composition of material on the road would result in a road with too poor a bearing capacity.

In the brochure "road maintenance bare ground", two different ways of treating the drawn-up material are described.

According to the first alternative, the line of drawn-up material is loaded into the vibrating grate bucket of a wheel loader, by means of which too large stones and turfs are sorted out. After sorting, the remaining material is emptied onto the surrounding ground, where possible. This method requires a road grader, which cuts the edges of the road and draws back

the material, and a wheel loader with a vibrating grate bucket, which means that two drivers are needed.

According to the second alternative, use is made of a so-called stone picker (schematic view, see Fig. 6). The stone picker is attached directly to the road grader or pulled by a separate tractor running after the road grader. Such a stone picker, which is designed to pick up stones in a field, has a number of arms rotating about a shaft which is arranged parallel to the surface of the ground and transversely of the longitudinal direction of the road. The arms encounter stones and turfs in the line of drawn-up material and throw them into a container. When the turfs are thrown into the container, a great amount of gravel is entrained.

According to the first alternative, a succession of machines and thus a number of drivers are required. According to the second alternative, too large quantities of gravel disappear.

SE-451,207 discloses a sorting machine for immediately reusing road gravel in material originating from road maintenance, such as material from graded road sides and edges. The sorting machine has a collecting assembly which collects the material, a conveyor belt which conveys the material from the collecting assembly up to a tumbler which is horizontally arranged and which separates the road gravel and puts it down on the roadway. The sorting unit further has a second conveyor belt which conveys undesired stones and the like from the collected material up to a container. The sorting unit is provided with a motor and is self-propelled. Also this construction requires two operators, one driving the road grader and another driving the sorting unit.

Both the stone picker and the sorting unit are insufficient in case irregular quantities of material have been graded off along the road. They are not capable of levelling the quantities along the road, and the separated roadway gravel will also be spread out irregularly.

Summary of the Invention

One object of the present invention is to provide a solution of the above-mentioned problems.

Another object is to provide a solution which requires as few persons (drivers) as possible and which minimises the need to add new gravel.

These objects are achieved by means of a mobile gravel sorter, which is of the kind stated by way of introduction and which is characterised in that the sorting unit comprises a substantially circular drum which is arranged after the gathering unit in the direction of travel and which has a centre axis, an inlet means in connection with the gathering unit and an outlet means which is arranged in connection with the collecting unit and separated from the inlet means in the longitudinal direction of the drum, at least one screw conveyor which extends in the drum between the inlet means and the outlet means about a helical axis which is substantially concentric with the centre axis of the drum, and a screen cloth means which is arranged to cover openings in the circumferential surface of the drum.

Preferred embodiments of the invention are stated in the dependent claims.

In the radial direction, the screw conveyor advantageously has an extension that is smaller than the inner radius of the drum and extends from the inside of the circumferential surface of the drum so that an axially directed return chamber forms about the centre axis between the inlet and the outlet means of the drum. As a result, it will be possible, when a great amount of material is fed into the gravel sorter, for the amount of the material that exceeds the volume of the defined space to be returned to preceding helical turns, and therefore there is time for all the material to be processed and passed through the meshes of the screen cloth.

Preferably, the drum and the screw conveyor are arranged to rotate together as one unit. Consequently,

the problem of material getting stuck between two elements that are movable in relation to each other is avoided, which prevents the sorting unit of the gravel sorter from jamming.

Brief Description of the Drawings

Below, the invention will be described in more detail with reference to the accompanying schematic drawings, which for the purpose of exemplification show a presently preferred embodiment of the invention.

Fig. 1 is a side view of the mobile gravel sorter.

Fig. 2 shows the mobile gravel sorter with removed cover from the side.

Fig. 3 shows an example of how the mobile gravel sorter can be connected to a tractor.

Fig. 4 shows the drum and the screw conveyor of the mobile gravel sorter seen from the inlet along their centre axes.

Fig. 5 shows the drum and the screw conveyor of the mobile gravel sorter in cross-section in a view similar to that in Fig. 4 at a distance from the inlet.

Fig. 6 shows a stone picker according to prior-art technique.

Description of a Preferred Embodiment

The main components of the gravel sorter comprise a chassis 10, a gathering unit 20, a sorting unit 30 and a collecting unit 40 (see Figs 1 and 2).

The chassis 10 consists of a Y-shaped frame structure 11-13 and is arranged to be connected to a road grader, tractor, wheel loader or the like, via a coupling 14 at the end of the leg 11, which is the single part of the Y and arranged in the front part of the chassis. Two wheels 15, 16 are mounted on the two spaced-apart legs 12, 13 of the Y arranged in the rear part of the chassis, thus making the gravel sorter roll along the road that is to be worked.

The gathering unit 20 is composed of sections 21, 22 which are arranged to gather the material in the line of drawn-up material and convey this material to the inlet opening 31 of the sorting unit 30.

The sorting unit 30 is secured to its centre shaft 32 and rotates therewith (see Figs 2, 4 and 5). On this centre shaft 32, two struts 33 are mounted opposite to each other in the radial direction at three places, namely at the two ends and in the middle. The struts 33 in turn support two flanges 34, 35 which in a helical line each, in the radial direction at a distance from the centre shaft 32, extend along the centre shaft 32. The struts 33 project a short distance from the helically shaped flanges 34, 35 and support a ring 36 (one at each end and one in the middle of the longitudinal direction of the centre shaft). These rings 36 form three circular outlines of a cylinder, and on these rings 36 a self-supporting screen cloth 37 is secured so that they are interconnected and so as to form a cylindrical drum. The screen cloth 37 is made of woven 5 mm spring steel and the size of its meshes is approximately 10% greater than the desired maximum size. The thus formed sorting unit 30 has a shape which is similar to that of a nut having two thread starts. The struts 33 project a short distance from the flanges 34, 35, which results in a gap being formed between the outer material (the screen cloth 37) and the threads (the flanges 34, 35) which gap is bridged by the struts 33.

The sorting unit 30 is suspended from the chassis 10 so that the projection of its centre shaft 32 on the roadway is parallel to the direction of travel, with an inclination of about 20° in relation to the horizontal plane so that its front end is located below its rear end. The front end of the centre shaft 32 is arranged to fit into a seat 17 placed in the chassis 10 approximately where the single leg of the Y merges with the other two legs. At the other end, the centre shaft 32 is supported

by the chassis 10 by means of an upright frame structure 18.

At the rear end of the centre shaft 32, a planetary gear 38 is arranged having a hydraulic motor 39 mounted directly thereon. The planetary gear 38 and the motor 39 are dimensioned to function as a support for supporting the sorting unit 30. This results in a simple and robust system which only requires a simple recess in the frame structure 18 of the chassis 10, in which recess the motor 39 and the planetary gear 38 are placed, after which the motor 39 is non-rotatingly secured by means of bolts.

The oil pressure of the hydraulic motor 39 is supplied via a quick coupling connected to the hydraulic system of the traction vehicle and lines arranged in the chassis 10.

In the radial direction, the helical flanges 34, 35 have an extension which is smaller than the distance between the centre shaft 32 and the screen cloth 37 and are arranged adjacent to the screen cloth 37 (with a small gap), which results in an open space being formed in the middle of the drum about the centre shaft 32 (see Fig. 5). However, precisely at the start of their helical shape, the flanges 34, 35 have an extension in the radial direction that is only slightly smaller than the radial distance between the centre shaft 32 and the screen cloth 37. This design has been found to be advantageous for the feeding and retaining of material.

At the rear end of the chassis 10 of the gravel sorter, a collecting unit 40 is arranged. This collecting unit 40 receives the material which has not passed through the meshes of the screen cloth 37 during the time and along the distance that the material has been worked and conveyed through the sorting unit 30. The collected material, for instance, large stones, grass roots and parts of plants, constitutes material that is not desirable in the base of the road, since it has a negative

effect on the bearing capacity of the base or the wearing course.

The mobile gravel sorter described above is above all intended to be used in the maintenance of existing gravel roads, where the aim is to recover the gravel which has slid down the embankment due to road traffic and the action of the weather. The material that has slid down the embankment is drawn up by means of a scraper or grader mounted on a tractor or road grader and gathered in a line on the road. The traction vehicle of the gravel sorter passes over the line of material which is gathered by the gathering unit 20 of the gravel sorter and further conveyed into the sorting unit 30. In the rotating sorting unit 30, the material is further conveyed upwards by means of the helical movement of the flanges 34, 35. Stones and gravel having a size that is smaller than a given size falls through the meshes of the screen cloth 37 down on the road. During the time when the material passes through the sorting unit 30, all turfs are broken up, the gravel bound thereto being released and falling down on the road. Large stones and plant parts do not fall through the screen cloth 37 and are further conveyed to the collecting unit 40.

Since there is an open space about the centre shaft 32, material can fall back to the beginning of the sorting unit, in case the compartments, which are defined by the angle of repose of the material, the screen cloth 37 and the flanges 34, 35, get overfull. This ensures that all the material has actually managed to be worked and had the chance to fall through the screen cloth 37 before it is conveyed to the collecting unit 40. Since the screen cloth 37 only lets through a certain amount of material per time unit (or stretch of a road at a constant speed along the road), the free space also has a levelling effect, which prevents the sorting unit 30 from being jammed and ensures that approximately the same amount of material is delivered along the stretch of the road. As already mentioned,

the flanges 34, 35 in the first part of their windings or turns have a radial extension such that the free space is much more limited, which causes the material sliding back to be retained in the sorting unit 30 (see Fig. 5).

By constructing and using the sorting unit 30 in this manner, such a great amount of the gravel material which has slid down the embankment is recovered that in many cases it is not necessary to add any new material to the wearing course of the road.

The collecting unit 40 can be operated and emptied by means of a hydraulic piston 41. In many cases, the easiest way of emptying the collecting unit 40 is simply to reverse the gravel sorter so that the collecting unit 40 is outside the road and also outside a possible ditch, and then just emptying the material.

To make it possible to turn to such an extent that the gravel sorter can be placed at such an angle when reversing, the traction vehicle should have relatively good manoeuvrability. A suitable constellation is the use of a wheel-mounted road grader which is connected to the front of a tractor or wheel loader and a gravel sorter which is arranged to be suspended from the three-point lifting means of the tractor (see Fig. 3). This constellation is then capable of drawing up the material from the embankment by means of the grader and returning this material to the road by means of the gravel sorter. When the collecting unit 40 of the gravel sorter is to be emptied, the grader can be lifted up and thus the traction vehicle can turn relatively sharply and move the gravel sorter off the road. The collecting unit is opened and the entire gravel sorter is tipped by means of the three-point lifting means of the tractor. This constellation makes it possible for one person to maintain a road in one trip and reuse the embankment material.

It goes without saying that in cases where it is not possible or suitable from the point of view of nature protection to empty the gravel sorter directly at the

roadside it can be emptied in a tractor bucket or the like.

It will be appreciated that a number of modifications of the embodiment of the gravel sorter described herein for the purpose of exemplification are possible without departing from the scope of the invention, which is defined in the appended claims.

CLAIMS

1. A mobile gravel sorter, which is arranged to move in a direction of travel along a road, comprising

a gathering unit (20) which is arranged to gather up granular material from a roadway as the gravel sorter moves in the direction of travel,

a sorting unit (30) for sorting and supplying to the roadway the amount of the material that is smaller than a given grain size, which sorting unit comprises a substantially circular drum which is arranged after the gathering unit in the direction of travel and which has a centre axis (32), an inlet means in connection with the gathering unit (20) and an outlet means which is arranged in connection with the collecting unit (40) and separated from the inlet means in the longitudinal direction of the drum,

a collecting unit (40) for collecting material exceeding said given grain size, and

a screen cloth means (37) which is arranged to cover openings in the circumferential surface of the drum, c h a r a c t e r i s e d in

that the sorting unit (30) further comprises at least one screw conveyor (34, 35) which extends in the drum between the inlet means and the outlet means about a helical axis which is substantially concentric with the centre axis (32) of the drum,

that the main elements of the screw conveyor comprise at least one radially directed flange (34, 35) which describes a helical line inside the drum,

that the radially directed flange of the screw conveyor in the radial direction has an extension that is smaller than the inner radius of the drum and extends from the inside of the circumferential surface of the drum so that an axially directed return chamber forms

about the centre axis (32) between the inlet and outlet means of the drum,

that the projection of the centre axis (32) of the drum on the roadway is directed substantially parallel to the direction of travel of the gravel sorter, the inlet means mainly consisting of an open drum end, which is the front end in the direction of travel, and the outlet means mainly consisting of an open drum end, which is the rear end in the direction of travel, and

that the centre axis (32) of the sorting unit (30) is inclined in relation to the horizontal plane so that its front end is lower than its rear end.

2. A gravel sorter as claimed in claim 1, in which the drum and the screw conveyor rotate together.

3. A gravel sorter as claimed in claim 1 or 2, in which the circumferential surface of the drum mainly consists of said screen cloth means (37).

4. A gravel sorter as claimed in any one of the preceding claims, in which the sorting unit comprises a supporting, rotating shaft (32) which is concentric with the centre axis of the drum and which supports the screw conveyor and the drum.

5. A gravel sorter as claimed in any one of the preceding claims, in which the inclination of the centre axis (32) of the sorting unit (30) is about 20° in relation to the horizontal plane.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 March 2001 (01.03.2001)

PCT

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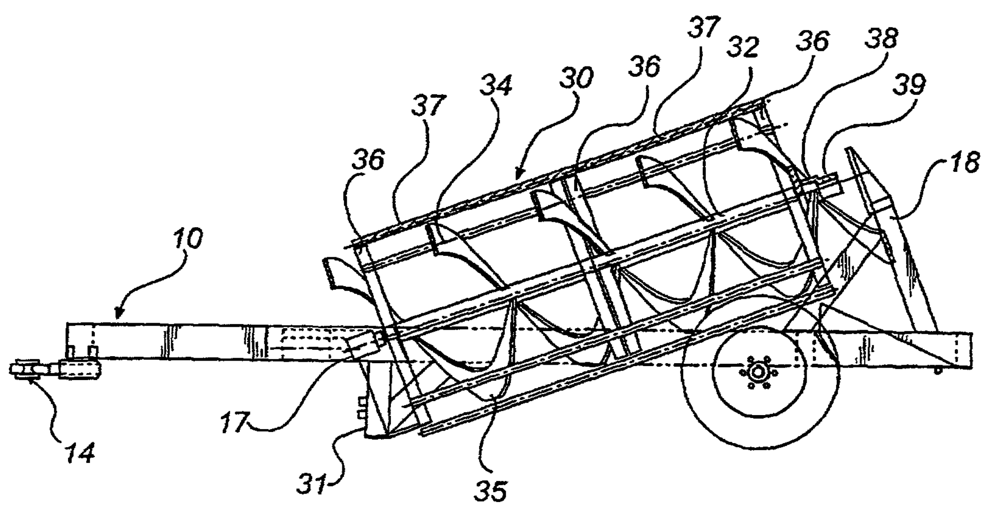
[Continued on next page]

(54) Title: GRAVEL SORTER



(57) Abstract: A mobile gravel sorter, which is arranged to move in a direction of travel along a road, comprising a gathering unit which is arranged to gather up granular material from a roadway as the gravel sorter moves in the direction of travel, a sorting unit (30) for sorting and supplying to the roadway the amount of the material that is smaller than a given grain size, and a collecting unit for collecting material exceeding said given grain size. The sorting unit (30) comprises a substantially circular drum which is arranged after the gathering unit in the direcetion of travel and which has a centre axis (32), an inlet means in connection with the gathering unit and an outlet means which is arranged in connection with the collecting unit and separated from the inlet means in the longitudinal diction of the drum, at least one scerw conveyor (34, 35) which extends in the drum between the inlet means and the outlet means about a helical axis which is substantially concentric with the centre axis (32) of the drum, and a screen cloth means (37) which is arranged to cover openings in the circumferential surface of the drum.

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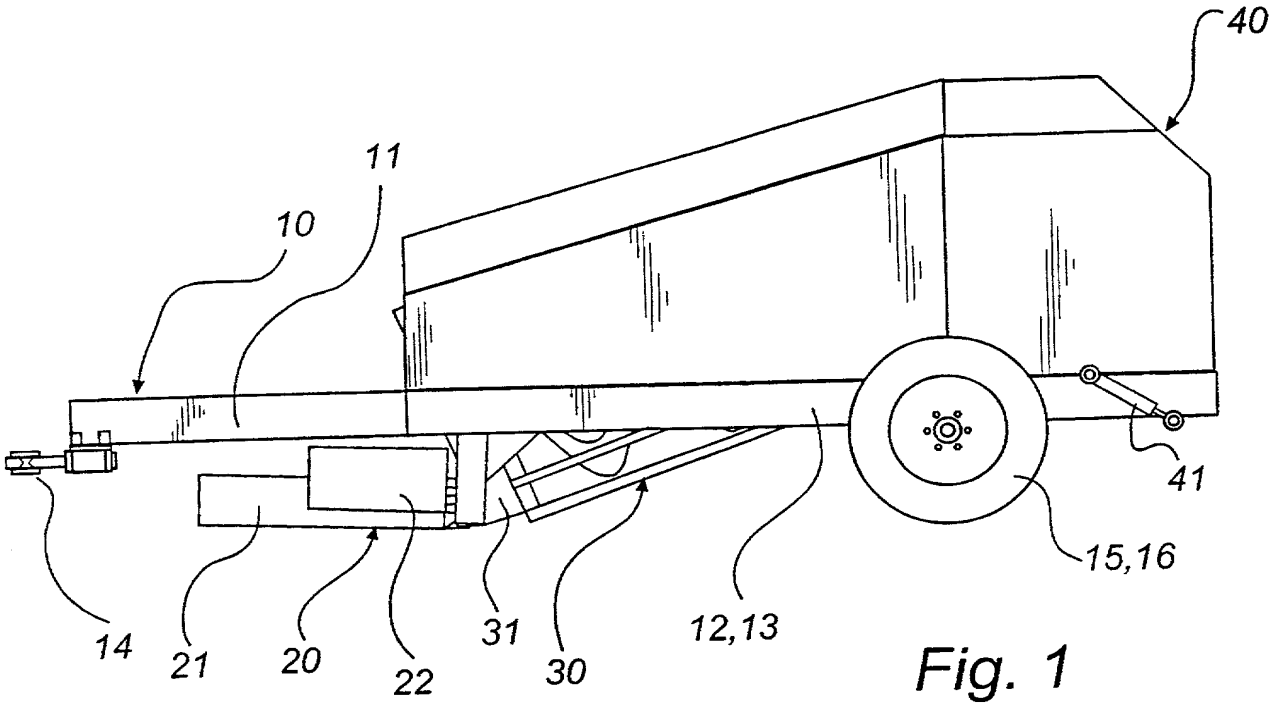
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Fig. 1

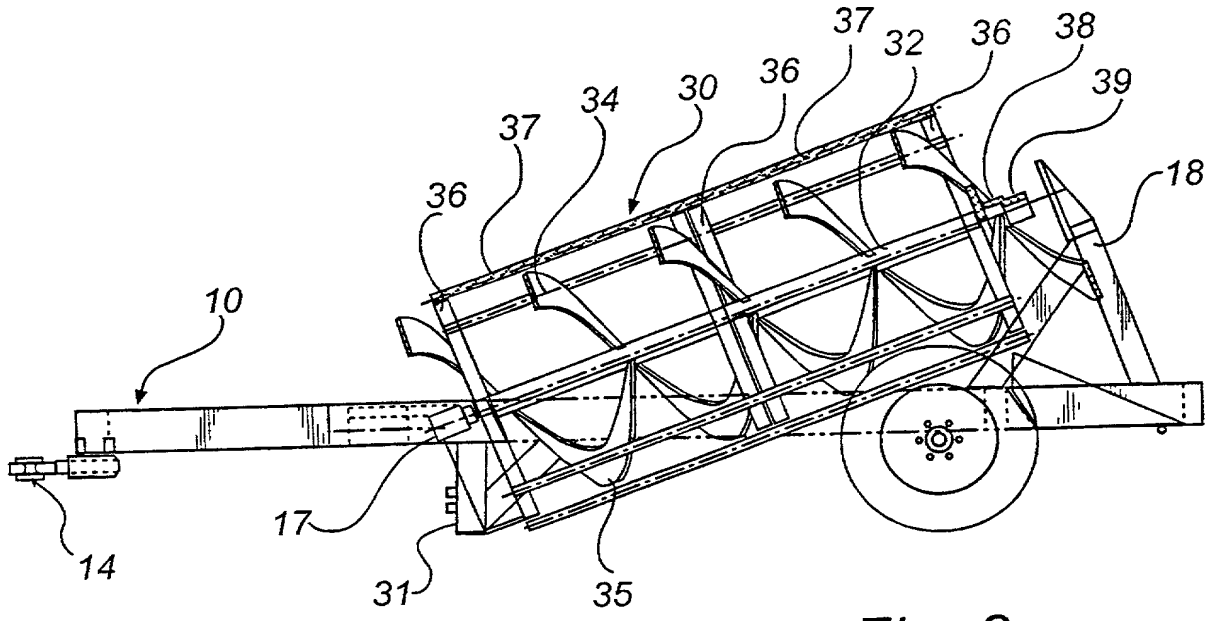
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Fig. 2

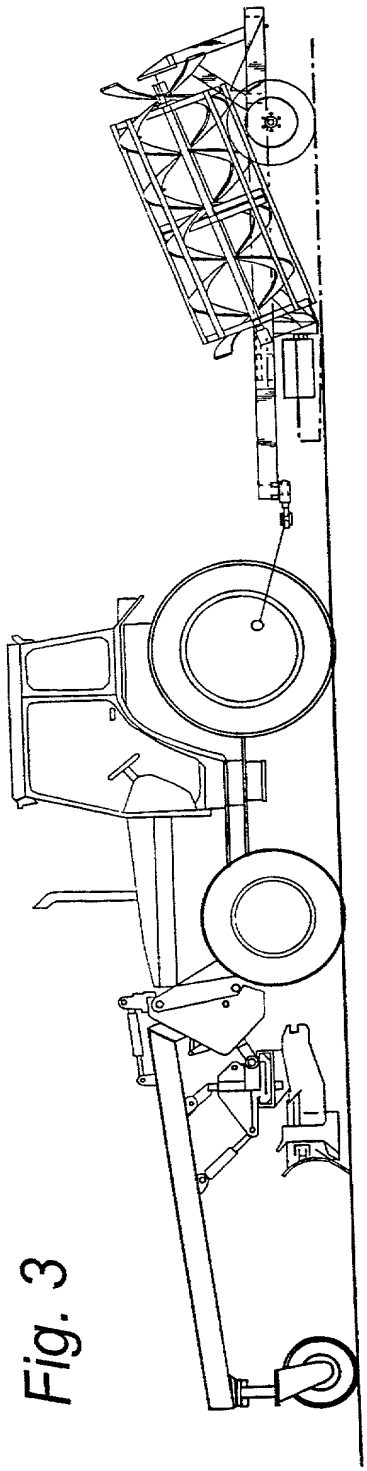

Fig. 3

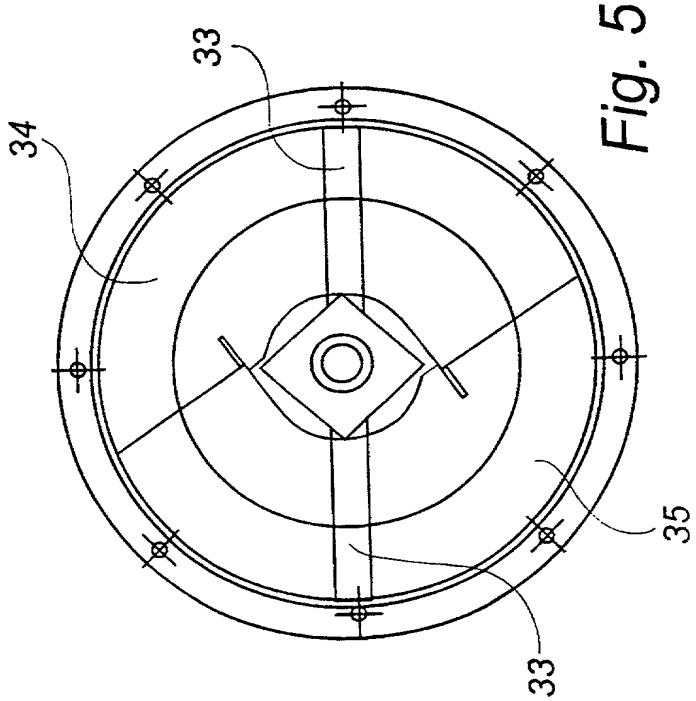

Fig. 5

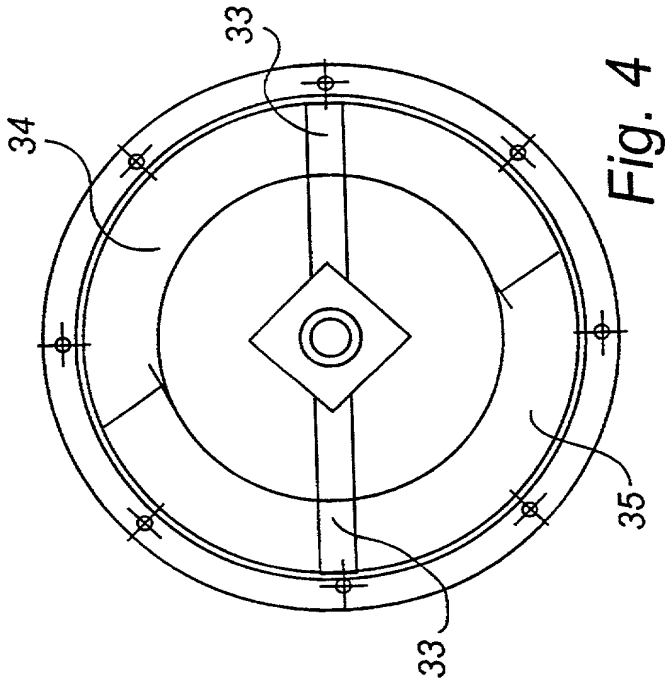

Fig. 4

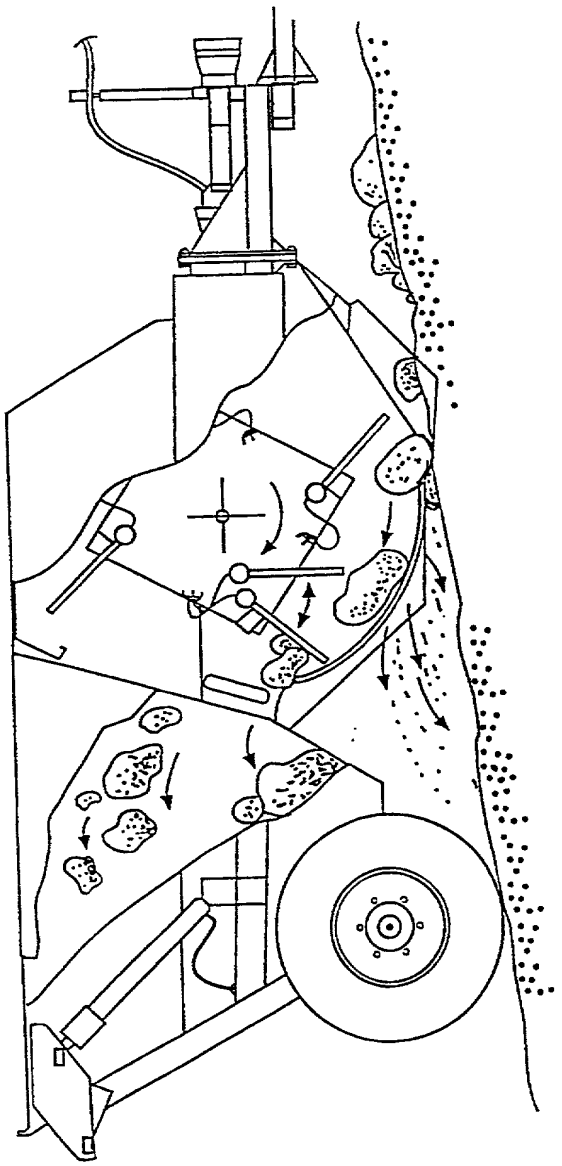

Fig. 6 (Prior art)

UNITED STATES (Form BDWY-I)
Patents & Design Patents
Sole & Joint Inventors
Convention & Non-convention
PCT & Non-PCT
This form cannot be amended. Altered or changed after it is signed.
(For use only for inventors who understand the English language.)

Declaration and Power of Attorney
United States Patent Application

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name.
I believe I am the original, first and sole inventor *(if only one name is listed below)* or an original, first and joint inventor *(if plural names are listed below)* of the subject matter which is claimed and for which a patent is sought on the invention entitled

GRAVEL SORTER

(check one)
- ☐ is attached hereto.
- ☐ was filed as U.S. Application No. _____ on _____ and *(if applicable)* was amended on _____.
- ☒ was filed as PCT International Application No. PCT/SE00/01633 on 24 August 2000 and *(if applicable)* was amended under PCT Article 19 on _____.

(I authorize any attorney appointed below to insert information in the preceding blanks.)

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign and PCT application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States of America listed in this Declaration. I have also identified below any foreign application for patent or inventor's certificate or PCT international application having a filing date before that of the application(s) on which priority is claimed:

Foreign/PCT Application No.	Country	Filing Date	Priority Claimed? (yes/no)
9902985-2	Sweden	24 August 1999	Yes

I hereby claim the benefit under Title 35, United States Code, § 120 or §365(c) of any United States application and PCT international application designating the United States of America listed in this Declaration and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, § 112. I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Application No.	Filing Date	*Status (patented/pending/abandoned?)*

I hereby claim priority benefits under Title 35 United States Code § 119(e) of any U .S. provisional application(s) listed below:

U.S. Provisional Application No.	Filing Date

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Joseph A. DeGrandi (17446), Robert G. Weilacher (20531), Richard G. Young (20628), Michael A. Makuch (32263), Dennis C. Rodgers (32936), Thomas L. Evans (35805), Frank C. Cimino, Jr. (39945). Carolyn Favorito (39183), George A. Metzenthin (P41995), and Steven W. Collier (P42429).

Send all correspondence to Beveridge, DeGrandi, Weilacher & Young, L:L.P., Suite 800, 1850 M Street, N.W., Washington, D.C. 20036. Facsimiles may be sent to (202) 659-1462. Direct all telephone calls to (202) 659-2811.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both. under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: Nils Lennart NILSSON — Citizenship: Swedish
Residence *(city, state, country)*: Jokkmokk, Sweden
Post office address: Wolfsgatan 2, S-962 32 JOKKMOKK, SWEDEN

Signature: _____ Date: February 14, 2002

Full name of second joint inventor, if any: — Citizenship:
Residence *(city, state, country)*:
Post office address:

Signature: _____ Date: _____

☐ Additional inventors and/or prior applications are listed in attached Supplemental Sheet(s).

Patent

Attorney's Docket No. _____

Applicant or Patentee: NIMEK INDUSTRIES NYA AKTIEBOLAG

Application or Patent No.: _____

Filed or Issued: _____

For: GRAVEL SORTER

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 C.F.R. § § 1.9(f) AND 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

[ ] the owner of the small business concern identified below:

[X] an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN NIMEK INDUSTRIES NYA AKTIEBOLAG

ADDRESS OF CONCERN Box 153, S-830 47 TRÅNGSVIKEN, SWEDEN

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 C.F.R. § 121.12, and reproduced in 37 C.F.R. § 1.9(d), for purposes of paying reduced fees under Sections 41 (a) and 41 (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average, over the previous fiscal year of the concern, of the persons employed on a full-time, part-time, or temporary' basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention entitled

GRAVEL SORTER

by inventor(s) Nils Lennart Nilsson

described in

[X] the specification filed herewith

[ ] Application No. _____, filed _____

[ ] Patent No. _____, issued _____

If the rights held by the above-identified small business concern are not exclusive, each individual, concern, or organization having rights to the invention is listed below,* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 C.F.R. § 1.9(c), or by any concern that would not qualify as either a small business concern under 37 C.F.R. § 1.9(d) or a nonprofit organization under 37 C.F.R. § 1.9(e).

* NOTE: Separate verified statements are required from each named person, concern, or organization having rights to the invention averring to their status as small entities. (37 C.F.R. § 1.27.)

Application Serial No. _____

Attorney's Docket No. _____

NAME _____

ADDRESS _____

[ ] individual [ ] small business concern [ ] nonprofit organization

NAME _____

ADDRESS _____

[ ] individual [ ] small business concern [ ] nonprofit organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earlier of the issue fee and any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 C.F.R. § 1.28(b).)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code; and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Lennart Wilsson

TITLE OF PERSON OTHER THAN OWNER President

ADDRESS OF PERSON SIGNING Wolfsgatan 2, 96232 Töllemolik, Sweden

SIGNATURE _____ DATE February 14, 2002